

Application No. 09/980,106
Filed: April 9, 2002
TC Art Unit: 1745
Confirmation No.: 1182

AMENDMENT TO THE CLAIMS

1. (Original) A system provided with a fuel processor for generating hydrogen from a hydrocarbon compound and a combustion path, along which the generated hydrogen is passed for combustion, and in which combustion path at least one fuel cell is included for at least generating electric energy and optionally heat through combustion of the hydrogen generated by the fuel processor, characterized in that the system is further provided with a first heat exchanger and a second heat exchanger which, on the one hand, are series included in the combustion path downstream of the fuel cell, a first heating circuit in which the fuel cell is included, and a second heating circuit in which the fuel processor is included, which first heat exchanger, on the other hand, is included in the first heating circuit for exchanging heat between the combustion path and the first heating circuit, and which second heat exchanger, on the other hand, is included in the second heating circuit for exchanging heat between the combustion path and the second heating circuit.
2. (Original) A system according to claim 1, characterized in that the system is further provided with a waste gas burner included in the combustion path between the fuel cell and the second heat exchanger.
3. (Previously Presented) A system according to claim 1, characterized in that the system is further provided with an afterburner or boiler burner included in the combustion path between the first and the second heat exchanger.

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4. (Previously Presented) A system according to claim 19, characterized in that the fuel cell, waste gas burner, second heat exchanger, afterburner and first heat exchanger are series connected.

5. (Previously Presented) A system according to claim 3, characterized in that the afterburner is further provided with a separate inlet for supplying a gas, such as natural gas.

6. (Previously Presented) A system according to claim 2, characterized in that the waste gas burner is further provided with at least one first inlet included in the combustion path and a second inlet for supplying air.

7. (Original) A system according to claim 6, characterized in that the system is arranged such that waste gas air originating from the fuel cell or air from elsewhere can be supplied to the waste gas burner.

8. (Previously Presented) A system according to claim 1, characterized in that the fuel cell is provided with a first inlet connected with the fuel processor for supplying hydrogen to the fuel cell, a second inlet for supplying air to the fuel cell, a first outlet for discharging waste gas from an anode of the fuel cell and a second outlet for discharging waste gas air from a cathode of the fuel cell.

9. (Previously Presented) A system according to claim 20, characterized in that the first outlet of the fuel cell is

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connected with the first inlet of the waste gas burner included in the combustion path.

10. (Original) A system according to claim 9, characterized in that the second outlet of the fuel cell is connected with the afterburner for supplying waste gas air from the fuel cell to the afterburner.

11. (Previously Presented) A system according to claim 10, characterized in that via a control valve the second outlet is also connected with the second inlet of the waste gas burner to supply waste gas air to the waste gas burner.

12. (Previously Presented) A system according to claim 8, characterized in that the system is further provided with a controllable first bypass connection for bridging the first inlet and the first outlet of the fuel cell when starting up the system.

13. (Original) A system according to claim 12, characterized in that the system is further provided with a second bypass connection for bridging the second inlet and the second outlet of the fuel cell when starting up the system.

14. (Previously Presented) A system according to claim 1, characterized in that the system is further provided with a central heating circuit and a third heat exchanger for exchanging heat between the first heating circuit and the central heating circuit.

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15. (Original) A system according to claim 14, characterized in that the central heating circuit is provided with a heat exchanger included in the combustion path downstream of the first heat exchanger.

16. (Previously Presented) A system according to claim 14, characterized in that the first heating circuit is designed as a reversible heating circuit in which a heat transport medium can be selectively pumped round in two directions.

17. (Previously Presented) A system according to claim 14, characterized in that the system is further provided with a heat destroyer in the form of, for instance, a fin included in the first heating circuit between the fuel cell and the third heat exchanger for adjustably discharging heat from the first heating circuit when the fuel cell, in use, cannot be cooled sufficiently after starting up.

18. (Previously Presented) A system according to claim 1, characterized in that the fuel processor is provided with humidifying means for humidifying the hydrocarbons supplied to the fuel processor, which humidifier is included in the second heat exchanger for supplying heat to the humidifying means.

19. (Previously Presented) A system according to claim 2, characterized in that the system is further provided with an afterburner or boiler burner included in the combustion path between the first and the second heat exchanger.

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20. (Previously Presented) A system according to claim 7, characterized in that the fuel cell is provided with a first inlet connected with the fuel processor for supplying hydrogen to the fuel cell, a second inlet for supplying air to the fuel cell, a first outlet for discharging waste gas from an anode of the fuel cell and a second outlet for discharging waste gas air from a cathode of the fuel cell.

21. (Previously Presented) A system according to claim 4, characterized in that:

the afterburner is further provided with a separate inlet for supplying a gas, such as natural gas;

the waste gas burner is further provided with at least one first inlet included in the combustion path and a second inlet for supplying air;

the system is arranged such that waste gas air originating from the fuel cell or air from elsewhere can be supplied to the waste gas burner.

22. (Previously Presented) A system according to claim 21, characterized in that:

the fuel cell is provided with a first inlet connected with the fuel processor for supplying hydrogen to the fuel cell, a second inlet for supplying air to the fuel cell, a first outlet for discharging waste gas from an anode of the fuel cell and a second outlet for discharging waste gas air from a cathode of the fuel cell;

the first outlet of the fuel cell is connected with the first inlet of the waste gas burner included in the combustion path;

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the second outlet of the fuel cell is connected with the afterburner for supplying waste gas air from the fuel cell to the afterburner;

via a control valve the second outlet is also connected with the second outlet of the waste gas burner to supply waste gas air to the waste gas burner;

the system is further provided with a controllable first bypass connection for bridging the first inlet and the first outlet of the fuel cell when starting up the system;

the system is further provided with a second bypass connection for bridging the second inlet and the second outlet of the fuel cell when starting up the system.

23. (Previously Presented) A system according to claim 22, characterized in that:

the system is further provided with a central heating circuit and a third heat exchanger for exchanging heat between the first heating circuit and the central heating circuit;

the central heating circuit is provided with a heat exchanger included in the combustion path downstream of the first heat exchanger;

the first heating circuit is designed as a reversible heating circuit in which a heat transport medium can be selectively pumped round in two directions;

the system is further provided with a heat destroyer in the form of, for instance, a fin included in the first heating circuit between the fuel cell and the third heat exchanger for adjustably discharging heat from the first heating circuit when the fuel cell, in use, cannot be cooled sufficiently after starting up.

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24. (Previously Presented) A system according to claim 23, characterized in that the fuel processor is provided with humidifying means for humidifying the hydrocarbons supplied to the fuel processor, which humidifier is included in the second heat exchanger for supplying heat to the humidifying means.

25. (New) A system provided with a fuel processor for generating hydrogen from a hydrocarbon compound and a combustion path, along which the generated hydrogen is passed for combustion, and in which combustion path at least one fuel cell is included for at least generating electric energy and optionally heat through combustion of the hydrogen generated by the fuel processor, characterized in that the system is further provided with a first heat exchanger and a second heat exchanger which, on the one hand, are series included in the combustion path downstream of the fuel cell, a first heating circuit in which the fuel cell is included, and a second heating circuit in which the fuel processor is included, which first heat exchanger, on the other hand, is included in the first heating circuit for exchanging heat between the combustion path and the first heating circuit, and which second heat exchanger, on the other hand, is included in the second heating circuit for exchanging heat between the combustion path and the second heating circuit;

characterized in that the system is further provided with an afterburner or boiler burner included in the combustion path between the first and the second heat exchanger; and

characterized in that the afterburner is further provided with a separate inlet for supplying a gas, such as natural gas.

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26. (New) A system provided with a fuel processor for generating hydrogen from a hydrocarbon compound and a combustion path, along which the generated hydrogen is passed for combustion, and in which combustion path at least one fuel cell is included for at least generating electric energy and optionally heat through combustion of the hydrogen generated by the fuel processor, characterized in that the system is further provided with a first heat exchanger and a second heat exchanger which, on the one hand, are series included in the combustion path downstream of the fuel cell, a first heating circuit in which the fuel cell is included, and a second heating circuit in which the fuel processor is included, which first heat exchanger, on the other hand, is included in the first heating circuit for exchanging heat between the combustion path and the first heating circuit, and which second heat exchanger, on the other hand, is included in the second heating circuit for exchanging heat between the combustion path and the second heating circuit;

characterized in that the system is further provided with a waste gas burner included in the combustion path between the fuel cell and the second heat exchanger; and

characterized in that the waste gas burner is further provided with at least one first inlet included in the combustion path and a second inlet for supplying air.

27. (New) A system provided with a fuel processor for generating hydrogen from a hydrocarbon compound and a combustion path, along which the generated hydrogen is passed for combustion, and in which combustion path at least one fuel cell is included for at

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least generating electric energy and optionally heat through combustion of the hydrogen generated by the fuel processor, characterized in that the system is further provided with a first heat exchanger and a second heat exchanger which, on the one hand, are series included in the combustion path downstream of the fuel cell, a first heating circuit in which the fuel cell is included, and a second heating circuit in which the fuel processor is included, which first heat exchanger, on the other hand, is included in the first heating circuit for exchanging heat between the combustion path and the first heating circuit, and which second heat exchanger, on the other hand, is included in the second heating circuit for exchanging heat between the combustion path and the second heating circuit;

characterized in that the fuel cell is provided with a first inlet connected with the fuel processor for supplying hydrogen to the fuel cell, a second inlet for supplying air to the fuel cell, a first outlet for discharging waste gas from an anode of the fuel cell and a second outlet for discharging waste gas air from a cathode of the fuel cell; and

characterized in that the system is further provided with a controllable first bypass connection for bridging the first inlet and the first outlet of the fuel cell when starting up the system.

28. (New) A system provided with a fuel processor for generating hydrogen from a hydrocarbon compound and a combustion path, along which the generated hydrogen is passed for combustion, and in which combustion path at least one fuel cell is included for at least generating electric energy and optionally heat through combustion of the hydrogen generated by the fuel processor,

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characterized in that the system is further provided with a first heat exchanger and a second heat exchanger which, on the one hand, are series included in the combustion path downstream of the fuel cell, a first heating circuit in which the fuel cell is included, and a second heating circuit in which the fuel processor is included, which first heat exchanger, on the other hand, is included in the first heating circuit for exchanging heat between the combustion path and the first heating circuit, and which second heat exchanger, on the other hand, is included in the second heating circuit for exchanging heat between the combustion path and the second heating circuit;

characterized in that the system is further provided with a waste gas burner included in the combustion path between the fuel cell and the second heat exchanger;

characterized in that the system is further provided with an afterburner or boiler burner included in the combustion path between the first and the second heat exchanger;

characterized in that the fuel cell, waste gas burner, second heat exchanger, afterburner and first heat exchanger are series connected; and

characterized in that the afterburner is further provided with a separate inlet for supplying a gas, such as natural gas, the waste gas burner is further provided with at least one first inlet included in the combustion path and a second inlet for supplying air, and the system is arranged such that waste gas air originating from the fuel cell or air from elsewhere can be supplied to the waste gas burner.